

# *The* CHICAGO NATURALIST



*Published by*

THE CHICAGO ACADEMY  
OF SCIENCES

VOL. 8 • NO. 4



DECEMBER • 1945





## The Chicago Academy of Sciences

Lincoln Park · Clark Street and Ogden Avenue

NATHAN S. DAVIS, M. D., *President*  
 JAMES P. SIMONDS, M. D., *Vice-President*      KENNETH A. REID, *Vice-President*  
 NAT T. BURFEIND, *Secretary*      WALTER A. GRAU, *Treasurer*  
 HOWARD K. GLOYD, Ph.D., *Director of the Museum*

### BOARD OF TRUSTEES

|                 |                        |                        |
|-----------------|------------------------|------------------------|
| Henry B. Babson | William D. Cox         | Nathan S. Davis, M. D. |
| Walter A. Grau  | W. F. Henderson, Ph.D. |                        |
| Burt A. Massee  | Lewis C. Walker        |                        |

### *Honorary Trustees*

|                    |                          |                   |
|--------------------|--------------------------|-------------------|
| F. R. Dickinson    | Frances Dickinson, M. D. | Eugene H. Garnett |
| Thomas D. Heed     | Hulburd Johnston         | Lloyd A. Laflin   |
| John Nash Ott, Jr. | Carroll H. Sudler        |                   |

President of the Chicago Park District, *ex officio*

### BOARD OF SCIENTIFIC GOVERNORS

|                           |                        |                       |
|---------------------------|------------------------|-----------------------|
| John R. Ball, Ph.D.       | Nathan S. Davis, M. D. | Alfred Emerson, Ph.D. |
| Charles E. Olmsted, Ph.D. |                        | Orlando Park, Ph.D.   |
| C. L. Turner, Ph.D.       | Hanford Tiffany, Ph.D. |                       |
| James P. Simonds, M. D.   | Nat T. Burfeind        |                       |

Superintendent of Schools, *ex officio*  
 Presidents of Affiliated Societies, *ex officio*

### AFFILIATED SOCIETIES

State Microscopical Society of Illinois  
 Illinois Audubon Society      Chicago Entomological Society  
 Marquette Geologists Association  
 Burnham Astronomical Society

# *The Chicago Naturalist*



*Published four times a year by*  
THE CHICAGO ACADEMY OF SCIENCES  
*Lincoln Park • Clark Street and Ogden Avenue*  
CHICAGO 14, ILLINOIS

---

VOLUME 8

DECEMBER, 1945  
(Published, March, 1946)

NUMBER 4

---

## *Contents*

|                                         |    |
|-----------------------------------------|----|
| Seven Baby Birds in Altenberg . . . . . | 67 |
| <i>Margaret Morse Nice</i>              |    |
| The World Without Microbes . . . . .    | 75 |
| <i>Otto Rahn</i>                        |    |
| The Specialist at Home . . . . .        | 79 |
| <i>Karl P. Schmidt</i>                  |    |
| Museum Activities . . . . .             | 85 |
| The Naturalist's Book Shelf . . . . .   | 86 |
| Cover Design: Flying Squirrel           |    |
| <i>Elsie Herbold Froeschner</i>         |    |



European redstart, adult male.



# Seven Baby Birds in Altenberg

MARGARET MORSE NICE

Illustrations after Heinroth\*

A nest with young birds was what we needed. After the high adventures of the Ninth International Ornithological Congress in Rouen, Paris and the Camargue, I had journeyed to study bird behavior with Dr. Konrad Lorenz. He was engaged in analyzing courtship ceremonies in his ducks, but I, searching for help in understanding song sparrows, wanted to raise some passerines. In Ohio I had studied territory, courtship, and population problems with adult song sparrows, but I had no intimate acquaintanceship with baby song sparrows. I needed to learn, first, how to raise little birds so they would be healthy, normal individuals; second, what to watch for in their development; and finally, how to distinguish between innate and learned behavior.

Birds were everywhere on the beautiful estate near Vienna — black-birds and titmice, song thrushes and Old World warblers — but nests, that was a different matter. Some that we found were old; others were just started. Only one of the many boxes distributed over the garden had been utilized, and it held only the beginnings of a nest. The gnarled old apple tree, that housed a family of tree sparrows, cousins of the cosmopolitan house sparrow, proved impossible to open with a saw. The young lesser white-throats, whose parents had raised our hopes by their protests, proved to be already out in the bushes. The spotted flycatchers soon lost their eggs to the jackdaws nesting in the roof of Lorenz Hall. "My jackdaws," said Dr. Lorenz, "ate your flycatchers."

Dr. Lorenz had told me of the charm of blue tits and their cunning, affectionate ways when raised by hand. So when a loud *zee-zee-ing* was traced to a knot-hole and a little blue and yellow head peered out, I was greatly elated. But here again we were too late; when Dr. Lorenz climbed to the nest, out scrambled the midgets. I was somewhat consoled, however, when I read in the Heinroths' "Vögel Mitteleuropas" that baby blue tits, are *too* friendly, that they climb all over their foster parent's hands and face, as if it were a tree, pecking and boring with sharp little beaks, until it is necessary to shut them in a cage, so as not to destroy their confidence in their friend!

There was another nest, however, that we had not investigated; on June 1st I noticed common redstarts carrying food into a crevice near the top of the chimney of a small, unused house on the grounds. Dr. Lorenz climbed to the roof while I watched with breathless interest; the nest might be inaccessible, or the infants too young or too old. Fortune

---

\*"Die Vögel Mitteleuropas," by Oskar and Magdalena Heinroth, 1924, vol. 1, Bermuhler, Berlin-Lichterfelde.

avored us at last: "Six babies just the right age!" Three of these and a blue egg were transferred to a handkerchief, and the package, held in the finder's teeth, journeyed to the ground.

With much excitement I looked at the wee redstarts, aged five days; long down sprouted from their heads, while scattered over their bodies was the promise of feathers. They could not be said to resemble their pretty mother with her soft buff coloring and red-brown tail, and still less their handsome father with his red breast, black throat and white forehead. (European redstarts, *Phoenicurus p. phoenicurus*, belong to the thrush family and are about the size of bluebirds.) It was a triumph at last to have our family.

Dr. Lorenz contrived a snug nest of flannel in a paper box; the babies opened wide their golden mouths, swallowed bunches of fresh ant pupae and were content. I put them on my bedside stand and at 3:30 the next morning a pleasant twittering awoke me. That day I fed them twenty-six times. I gave them a late supper, drew the window curtains, and covered the little birds with flannelette; thanks to these measures, they let me sleep until 4 A.M. I fell asleep again, but not for long; as I dozed, I tried to persuade myself that it was merely a barn swallow calling outside, instead of three foster babies on my stand. I soon learned to lie motionless, for the least sound on my part meant an explosion of piteous pleas from my starving infants.

In my walks after tea up the hill into the beech woods or down the meadows by the Danube, always I was on the lookout for a second family. Nothing came my way, but on June 5th on my return from a morning walk, I found a present awaiting me from a young bird student and friend of the Lorenzes, Hermann Kacher. A branch of Norway spruce hung on the wall; in it was a dirty little nest and three extraordinary looking babies. "Serins!" I said in dismay. Dr. Lorenz had told me that these birds, *Serinus canaria serinus*, close relatives of the wild canary of the Canary Islands, were hard to raise by hand, since their parents fed them by regurgitation; the best way to bring up young serins was to give the eggs to a canary and let her do the work.

We fixed up a mixture of cooked millet seed, chopped nettle leaves, egg yolk, milk and bread, but the problem was to get it down them. The ridiculous little things stood up straight, stretching as high as possible, frantically waving their wee wings and screeching with wide open ruby-colored mouths. They had a weazened look and I called them the "Three Ungraces." It was difficult to get their little crops filled and they kept up a constant peeping. We tried medicine droppers and by using hemlock twigs pushed nourishment down their silly throats until all our droppers were broken. I found them quite a trial.

The next morning I left the two nests side by side when I went out on the porch; on my return, both nests exploded into life and the serins



swarmed over into the redstarts' nest, apparently taking their neighbors for their lost parents. I divided the families but, after it happened again, put the serins into an artificial nest in a box with high sides. Gradually they and I became more adapted to each other in the matter of feeding process. By comparing them with pictures in the Heinroths' volumes, we estimated they must have been about eleven days old when adopted.

The redstarts at the age of nine days had grown into fluffy, feathery balls when all at once a change came over them; they lay quiet with their bright eyes looking out, and made no move at the shutting of a door or at my approach. I became worried and whistled; at once they begged. At Dr. Lorenz's suggestion I fixed up a covered box for them, and here they seemed more at ease. Instinct told them that large moving objects



Thirteen-day-old serins begging.

were dangerous, yet it was just such an object that brought them food. They solved the difficulty by a compromise: they faced the back of the nest and turned their heads around when fed!

Fear vanished as suddenly as it came; at fourteen days they all climbed out of the nest. I gathered them up and installed them in a roomy cage; here they lived contentedly, cuddling together side by side like little birds on a Christmas card. I called them Gelb, Rot and Blau according to the color of their bands.

That evening as we were in the upper garden gathering green food for the baby ducks and geese, Dr. Lorenz uncovered in the grass a little redstart about two days younger than ours. Since no parents seemed to be about, we adopted him. He proved to be tame enough, but he just wouldn't open his bill to be fed! He often hopped up beside the bird I fed, but the loud food-call, energetic wing fluttering and open gapes

of his companions brought no response from him. We had to feed him forcibly the first morning.

At last in the afternoon when the others started to fly about, he opened his mouth and I was able to stuff something down him. Twice I excited him by rapidly moving the forceps in front of him. Gelb jumped on his back, open came his bill and in went some ant "eggs." I hit him lightly on the back, and got in one mouthful, but only one. Head tapplings did not prove to be the open sesame.



Redstart, eleven days old.

The next morning started auspiciously; Wildling begged from sheer hunger at breakfast. After that he begged whenever a comrade alighted nearby and immediately afterwards would open his bill for me. By noon he was begging as well as any of his foster brothers, and a week later he was the tamest of them all.

It was at the age of sixteen days that Rot first picked up ant pupae for himself. All three now flew skillfully about the room, their landing technique perfected. It was often a problem to capture them to get them back into their cage; they had no notion of coming to call and their favorite perches on the curtain rods or the top of the chandelier brought them above my reach even with the furniture serving as step ladders. In desperation I presented the end of my closed umbrella to Blau; she begged to it! The next minute, however, she stepped on it and rode in state back to the cage. But her brothers were terrified at the queer contraption.

The day that the redstarts left the nest, I moved the serins into another cage, well furnished with spruce branches; the little birds climbed about rather unsteadily, stretched and preened themselves, and seemed well pleased with their new home. Two days later one of them flew to the window. The others contented themselves with flapping their wings very rapidly, occasionally letting go of the branch and rising a bit in the air. They looked for all the world like the moving pictures of Dr. Francis Herrick's young bald eagles!



Two of the serins were named Bluet and Snowdrop in accordance with the color of their bands. Their brother was a noisy creature; no matter how well filled was his crop, he still continued his tiresome *yip yip yip yip*. I called him Cry-baby. All three moved about with tiny steps and sometimes would travel the length of my arm in a sort of Susy-Q dance.

I will quote from my diary:

"June 15. 7:35 A. M. All is quiet now. The redstarts, balls of fluff in soft tones of grey and brown buff, are resting after their large breakfast — Gelb and Rot a little apart on the spruce twig, Wildling crowded close to Blau on the perch. The serins are distributed on top of their friends' cage; grey and yellowish, they are a bit fluffy now, but are far from the redstarts' engaging picture of baby innocence.

"Five minutes later, the company wakes up. The redstarts stretch and preen; then hop to the floor of the cage and pick up stray ant "eggs." The serins examine things on the table top, Cry-baby accompanying his actions with his familiar complaints. I take the top off the cage and the redstarts scatter to the four corners of the room.



Serin just after leaving nest, sixteen days old.

"8 A. M. My breakfast of tea and rolls is brought in. Rot comes to visit me, alighting on the edge of the tray. I offer him a crumb; he begs, but seems disconcerted by my fingers instead of the forceps from which for the last two weeks he has received all his meals. Bluet, seeing something is up, alights on my left hand. She is pleased to nibble the crumb, then turns her attention to the clasp of my watch ribbon and finally to my sweater. Snowdrop alights on my head. Rot, in the meantime, has caught his first ant."

How had it affected me, thus suddenly becoming foster mother to seven charming baby birds? In the first place, I learned to lie very still

in bed in the morning. Secondly, I found that, when away from the birdlings, I could easily dismiss them from my mind for about an hour, but after that I became more and more uneasy, the urge to return became stronger and stronger, as my anxiety grew lest some misfortune might have befallen them. Finally, my attitude toward flies completely changed; instead of obnoxious pests, they became valuable prey. On my hunting expeditions to various windows of the great house I discovered there were many different kinds and sizes, and how I did prize the largest ones and how eagerly I followed their buzzing, blundering courses!

When the redstarts were eighteen days old, I heard something new — a soft warbling song. It came from Gelb, who sat on the perch with closed bill and vibrating throat, Wildling and Blau pressed tightly against him. The next day Rot also sang, and two days later Wildling. It seemed an extraordinarily early age to start singing.



Redstart, thirty-two days old.

So far the two families had been good friends and Wildling had even tried to cuddle against the serins on top of the cage, pushing these small creatures farther and farther along and finally off the edge, all with the best intentions. But on June 16th Rot drove Bluet off the rim of the redstarts' cage and chased her about the room! Soon afterward I was shocked to see Blau seize Cry-baby by a feather of his head and pull at it.

The next day I wrote:

"7:30. The redstarts are a delight; they stand so straight and alert, and wag their red-brown tails so busily after alighting. Two were cuddled together on the curtain rod when Anna brought in breakfast.

"Das muss ein Liebespaar sein!" she said.



"8:20. Bluet flies to my hand, then back to the top of the redstarts' cage. Rot opens his bill at her and she retreats. The next minute Cry-baby lands on top of Rot, knocking him to the bottom of the cage.

"I hear a loud disagreeable, new note; it comes from Cry-baby who is saying *ga-ga-ga-ga-ga* at Rot, completely bluffing the latter."

It certainly was an absurd sight—the pygmy Cry-baby repulsing the redstart that looked three times as large—from the redstarts' own cage. It was a brand new note and brand new behavior.

Later in the day I discovered that Bluet was also using the threat note; there was a set-to between her and Rot on the window sill with



European cuckoo, twenty-nine days old.

passes back and forth until he left. Later Cry-baby, Gelb and Blau were on the floor of the redstarts' cage; Cry-baby opened his bill and scolded; the others pecked at him. He drove them on up the perches!

When Cry-baby was about three and a half weeks old, he again surprised me by a new note; sitting on his left foot he sang—rather a loud twitter, much like the song of the adult serin. The next day he was again singing, but this time *with his head under his wing!* It was the most ridiculous sight—*twichy weech weech* coming from a shaking, feathery ball with a tail attached. It almost appeared as if some grotesque little monster were singing, the sound issuing from the rising and falling breast feathers.

And now a new bird came into our possession—a cuckoo (*Cuculus canorus canorus*), a handsome black and white mottled creature about three weeks old, found in a black redstart's nest. When Dr. Lorenz tried to feed it, it spread its wings and tail, shook its body, and opened its

mouth to bite. For the most part it sat with its bill obstinately closed. My baby birds were out on the porch at this time; soon I brought them in and opened the cages. At once the cuckoo's mouth came open. Whenever a little bird flew near, the great red cavern gaped. Gelb and Rot stared in astonishment. I improved the occasion by stuffing food down its throat. When the mouth had snapped shut, I could sometimes get it open by bringing a serin nearby, or by taps on the head, the place from which small fosterers often feed the large parasite. It never fluttered its wings; its begging note was a faint *yip*; the irresistible attraction to fosterers resides in the great red mouth. Wildling landed



Serin, adult male.

nearby; at once the yawning cavity turned toward him and was held there in solemn expectation, but Wildling failed to understand.

The next day the cuckoo remained in a cage on the porch and by afternoon I was able to train it to take food from the forceps. The following day I brought it back near my little birds and immediately the lower jaw dropped open in the former automatic fashion.

It was time for me to leave my little birds. Dr. Lorenz took them into his room and later wrote me news of them. Wildling became wild again, but Gelb, Rot and Blau stayed tame and peaceable, always sleeping side by side. In September they flew away. Of the serins, Bluet was the only one kept by Dr. Lorenz. She sang a little as long as she was alone, but not after a wild-caught male was put in her cage, although she remained rather dominant over her shy husband.

It had been a rich and happy experience for me with the kind Lorenz family and their household and the trusting baby birds. I had learned what I hoped for in Altenberg; I traveled home to raise and study baby song sparrows.



# The World Without Microbes\*

OTTO RAHN

The interrelations between microbes and the higher plants and animals, including man and his civilization, have been shown to be so manifold and diversified that some readers might want a short summary. Instead of repeating briefly and monotonously the contents of chapter after chapter, let us realize the good and bad features of microbes by visualizing a world without them. Let us imagine what would happen if suddenly each and every microbe on earth were killed, perhaps by a collision of the earth with the tail of a comet which contains a mysterious gas killing all microbes without doing any damage to plants, animals and man.

Our first reaction is a sigh of relief for we think first of the freedom from contagious diseases. People sick from typhoid, diphtheria or meningitis or other microbial diseases will recover quickly except where vitality is too low already to overcome the damage done by toxins or other bacterial poisons. We rejoice over the certainty that no new cases can develop, no epidemics will ever threaten humanity again. We can change the tuberculosis hospitals to old people's homes, and the leprosy colonies to public bathing beaches. Quarantine and vaccination exist only in old fairytale books and sound like medieval torture to the new generation. The farmer will be happy that his livestock is safe now from glanders, contagious abortion, hog cholera and chicken diarrhoea. And how his crops will thrive now, without danger from blight or wilt or leafspot or tumors! It sounds like a bumper crop each year.

And our food will keep now. We can discard the refrigerator, for now, meat will not become smelly, vegetables will not rot, oranges and apples will not mold, cider will not ferment. If we only protect our food from drying and from too much light and air, food will keep. No more need for canning, drying, pickling, freezing! It sounds almost too good. What an easy life.

Of course, there are some drawbacks. If food cannot spoil, cabbage cannot change to sauerkraut. We might make it by putting vinegar in the cabbage, but there is no vinegar because all vinegar bacteria were killed by the comet. Well, we can make vinegar chemically, for instance by dry distillation of wood. It has not the flavor of fruit vinegar, it is chemically pure acetic acid diluted with water, but it is at least sour, and we could add artificial flavors.

---

\*Final chapter of *Microbes of Merit*, The Jacques Cattell Press, 1945. Reprinted with permission of the author and publishers.

Speaking of vinegar reminds us of the hard cider from which vinegar was formerly made. All yeasts are dead; there is no hard cider, no beer or wine. But there is still industrial alcohol. That can be made chemically; some alcohol is now manufactured in this way. Baking powder can be substituted for the bread yeast.

We can buy a whole month's supply of milk and cream because it keeps. But as it does not sour, we have no buttermilk, and no cottage cheese. If lactic acid can be made cheaply by the chemist, it could be added to the milk to make cottage cheese. With vinegar, it would not taste so good. And as to hard cheeses like cheddar which are now ripened by bacteria, we might learn to produce a similar result by adding pepsin.

As long as our cows give plenty of milk, we need not worry about dairy products. They may taste a little different, but the food value would be the same. But will the cows continue to give plenty of milk? Cows can digest cellulose, and live largely on grass and hay because some bacteria in their complex stomach predigest the cellulose for them. Now that these bacteria are dead, cellulose is indigestible to cattle, and they must be fed like pigs and chickens with a more concentrated food, such as grains and seeds and oil cake, perhaps even meat scraps. That is expensive feeding.

The farmer will have to raise more corn and alfalfa and beans than ever before, to make up for the loss of cellulose digestion by the cattle, and at first glance, the prospects of large crops look very good because there are no more plant diseases. But let us take a second glance, at the soil where the roots of the plants take up the minerals and nitrate and send it to the leaves to be transformed into proteins. There is only very little nitrate in the soil at any one time. Most of the soil nitrogen is in reserve, in form of humus which is decomposed but very sparingly by bacteria, and furnishes a slowly, but continuously flowing source of nitrate. Without bacteria, this source cannot flow. The nitrogen is locked up, and the key is lost. After the plants have used up the small amount of nitrate which was in the soil when the earth collided with the comet's tail, there is no more nitrate, nor any other nitrogenous plant food. The nitrogen-fixing bacteria are also dead, and the legumes must have nitrate like all other plants.

To prevent the plants from starving, we must fertilize the fields frequently. Then we make a very disappointing discovery: the barnyard manure does not fertilize. It contains no nitrate, not even ammonia which some plants could use. It does not smell as it did in the days before the comet. It contains many valuable substances which bacteria could very quickly change into plant food. But as there are no bacteria, the plants can use none of the substances in the barnyard manure.



The only thing that will keep the plants alive now is nitrate. Fortunately we have learned to make nitrate from the nitrogen and oxygen of the air by means of electricity, and it is manufactured in enormous quantities. Nitrate will be the most important industry in post-comet days because all life on earth will depend upon our ability to keep the plants alive. Without nitrate no plants, and without plants no food for man or animals.\*

Nitrate production may become enormous, but it is limited by the available electricity, and our ability to distribute the nitrate also has its limits. It will not be possible to bring it to every corner of the world. The large forests in northern Michigan and in the Rocky Mountains cannot be provided with nitrates, and it is unavoidable that they will die within a few months. In fact, very large areas of our country will become deserts, not from lack of water, but of nitrate; and the green areas will be oases surrounding the more densely populated parts of the country while the rest becomes a desert. In countries whose industry is not as far developed as ours, the population will be starved to death in a short time. The same fate would have happened to us if the collision had occurred fifty years earlier, because nitrate manufacture is a very recent industry.

We can now provide enough nitrate to produce crops for our food, and we might continue a fairly normal life for a while, with our normal supply of coal and water power, with iron and gasoline, with automobiles and airplanes. We will live to see the Rocky Mountains studded with dead trees which will sooner or later be destroyed by unavoidable forest fires. We may not live long enough to see all the fertile soil, which is no longer held in place by grass and tree roots, being washed into the creeks, so that only bare rock remains where Yellowstone Park used to be.

We may not live long enough to see this happen because a peculiar, almost unknown disease will befall all of us within a few months after the collision. It is an avitaminosis. The bacteria in our intestine which provided us with certain vitamins, are dead. Our regular food does not contain quite enough for our needs, and our store becomes gradually exhausted, and we become ill. If sufficient amounts of the needed vitamins can be made by chemical factories, we can continue to live. If not, there is still a chance of extracting enough of the vitamins from the dwindling plant growth on earth. If that fails too, human life on earth ceases entirely, and with it, the last traces of plant life would also disappear. All life on earth has come to an end because the microbes died.

But if we can replace the vitamins formerly furnished by the intestinal bacteria, we can maintain human life, and national life, and a civilized

---

\*It is worthy of note that now, the plants depend entirely on man to provide them with plant food. Heretofore, plants were independent, and man dependent on plants. Now we have true symbiosis where one cannot live without the other.

life. We certainly cannot afford to go back to stone age civilization. Only a highly industrialized people can survive under this predicament of no microbes. So many things will become so entirely different that the new, microbe-less civilization must appear very artificial indeed to the survivors of pre-comet days.

One more great change has not been mentioned yet, and that is the difficulty of water supply. There is as much water on the earth after the comet collision as there was before, but it will be a different water. At present, all water in all rivers and lakes is continuously contaminated with sewage, and that cannot be changed after the bacteria are dead, because of the enormous volumes of water involved. All sewage must ultimately go into rivers, lakes or oceans. As long as we had bacteria, they decomposed the organic matter of sewage slowly, but completely. Some towns dumped all their sewage, after preliminary purification, into a river, and other towns, farther down the river, used that same water for their water supply without fear or loathing because it had become completely purified, thanks to the bacteria. Now that bacteria have completely disappeared from the face of the earth, there is no danger from contagious intestinal diseases, no danger of bad odors from putrefaction, no danger to aquatic life through exhaustion of the oxygen in the water. But all that just indicates that the sewage, after flowing down the river 50 or 100 miles, is still sewage, that means a murky liquid made cloudy by finely suspended particles of human excreta, and containing relatively large amounts of urea. The sewage emptied into the Mississippi at St. Paul arrives weeks later at New Orleans in the same condition, only more concentrated by the sewage from all communities along the river, including Chicago. It is unavoidable that in a short time, all lakes and even the oceans will contain sewage in very noticeable amounts. This sewage does not smell, and people might to some extent overcome the feeling of repulsion for fecal matter, but it does not seem very probable that swimming in sewage, even in diluted sewage, would be a very popular sport.

As to the drinking water, the solution is simple. Rain water is as pure as ever, and all house owners could construct their roofs so as to catch the largest amount possible, and store it in cisterns. Deep wells may become as precious as oil wells. Our water supply will be smaller, but it will be good.

That is the prospect of life without microbes. It will seem a strange life to us who take the cooperation of microbes for granted, and it will be a hard life, but probably we can make it. Although we will be safe from any contagious diseases for ever, life without microbes may seem hardly worth living to most of us.

Let us hope that we never collide with the tail of such a comet.

# The Specialist at Home

KARL P. SCHMIDT\*

The title of this article is purposely chosen to catch the reader's eye with the erroneous impression that he is to read about the home life of the specialist, that half-mythical scientist of the laboratories and museums who is engaged in learning more and more about less and less, and who becomes more and more isolated from the realities of life in the process. My specialist to be discussed is of an extremely different type—the remarkable and interesting kind of person who is the scientist (and specialist) *only* at home, whose interest in science is his avocation and whose bread and butter comes from some more familiar employment. The list of such "specialists" includes bankers and brick-layers, editors and green-grocers, medical men and real-estate dealers, army officers and employees of the foreign service, men of independent means, and of course teachers. At least in their field of specialization in science, such persons are mainly self-educated.

It is a striking testimonial to the work of such amateur scientists that their studies (and their publications on their researches) have very often led them into the more professional positions in universities or museums. Their published results often meet every standard of scholarship of their more professional colleagues.

It is not sufficiently known in the non-scientific world that the acquisition of an avocation of such an extraordinary nature is relatively easy, and that such amateur specialists are the most welcome allies of the professionals. The very fact that they enter upon scientific work without professional training may be a significant advantage, for the lack of formal schooling may be more than counter-balanced by the absence of inhibitions and by originality. In another field, a paradox has been stated as a concern over the future of English literature on account of the decline of illiteracy.

As refers to scientific training, scientific illiteracy can be wholly overcome by native ability, for Charles Darwin was essentially an amateur biologist, an English "country gentleman," whose twenty years of thoughtful observation, reading, and note-gathering shook the scientific world to its foundations with the publication of the *Origin of Species*. Another example, from a university world more ridden by form and tradition (in the sciences) than the English, is presented by Wilhelm Hofmeister, the discoverer of the basic homologies in the alternation of generations in plants, and clearly the greatest of the botanists of the last century. Hofmeister, entirely without academic training became head of the Department of Botany at Heidelberg at the age of 39. An extraordinary parallel

---

\*Chief Curator of Zoology, Chicago Natural History Museum.



to Hofmeister's career is presented by that of the late Edward W. Berry, the eminent paleobotanist, who became, with no more than a high school education so far as formal schooling is concerned, the dean of the graduate school of Johns Hopkins University. Professor Berry's self-education thus became the full equivalent, and indeed far more than the equivalent, of the best university training of seven years for the degrees of Bachelor of Arts and Doctor of Philosophy.

It may be objected that there is little point in citing men of genius as models for us more common mortals, and indeed, I cite Darwin and Hofmeister and Berry only to convey the fact that the self-trained scholar, and thus the amateur, need not of necessity remain at the humbler levels in the learned world. Let us then turn to the specialist who brings to his studies the average human equipment of intellectual ability and a little more than the average of persistence, combined with the stimulus of enthusiasm most commonly supplied by some inspiring teacher, or by some naturalist with whom chance puts him in contact.

A veritable guide book for entry into the sciences at an early age is supplied in *By-ways to Adventure* by Edwin Way Teale, whose personal history of self-education is reflected in his autobiographic *Dune Boy*. *By-ways to Adventure* lists the principal scientific fields that are open to boys and girls (let us say at the level of high school or even at that of the upper grades), gives a good list of references, and introduces the reader to the amateur scientific society. This is a most helpful aspect of elementary education in the sciences, but is mentioned here only in passing to point the moral of the value of self-education still further, and to suggest the opportunities for it at the juvenile level.

Another work that may serve as a stimulus to investigations suitable for a suburban home is by an eminent professional. Dr. Frank E. Lutz was long the head of the department of entomology at the museum of natural history in New York. Physically and physiognomically he quite well fulfilled the popular idea of what a typical entomologist should be like. Actually, no entomologist of our day had a more genuine breadth of interest in his field at the level of public education (he invented the "Nature Trail"), or exhibited so much ingenuity in the types of experimentation and observation that can be carried on "under one's own power." The book in question bears the punning title *A Lot of Insects*, and is the running history of a lifetime of entomological studies pursued in his backyard at home. Dr. Lutz was affectionately known in his home town of Ramsey, New Jersey, as the "Bug Doctor," to distinguish his Ph.D. from the local M.D.

All this by way of introduction to the special type of specialist on whom I wish to comment, namely the one who studies intensely a single group of insects. The insects have evolved so vast a variety of species as

to outnumber all other forms of animal and plant life together. The beetle group alone, one of the principal orders of insects, comprises more than three hundred thousand described species, and these are divided into about a hundred and fifty families. Some of these families are relatively small, and thus afford a sharply defined group of such numbers that one may become expert in their study within a few years. Other families are excessively large, and a specialist, to be a good one, may be forced to confine his studies to a single subfamily or to a group of genera. Other orders of insects, notably the true bugs (Heteroptera and Homoptera), require study family by family by a specialist. The specialist on such a limited and specific group of insects has a most extraordinary variety of possible interests that combine to make his devotion to his studies complete. Evenings and week-ends and vacations will be all too short for his studies.

The development of such a special interest may run a normal course about as follows. The student decides on a particular group of animals, and for the limitations set by the present essay, on a special group of insects. This will require some aid, either from textbooks (which are readily available), from an entomological acquaintance, or from the nearest state university or larger museum. The entry into the field by active and quite indiscriminate collecting may be made, using any one of the excellent published directions for collecting insects for study. The pamphlet "How to collect and preserve insects" by H. H. Ross, published by the Illinois State Natural History Survey, is especially to be recommended. The specimens, if well prepared, will be gratefully received by the nearest museum, and such gifts of material will put the collector into correspondence with someone who can guide his initial studies. Indeed, he may receive correctly identified specimens in return, as a nucleus for his personal collection.

Next, having chosen a special group from the multitude of kinds of insects, available even in the suburbs of the largest cities, our prospective student concentrates on collecting these forms and on learning as much as he can about their local occurrence and habits. An excellent introduction (with further references) is to be had in "How to know the insects," by H. E. Jaques. If such studies and collections are made for almost any group of insects whatever, new information will turn up, new locality records, perhaps for the whole region, will be made, improvements in the classification will suggest themselves, including the description of "new species," and material is presented for the first publications in an entomological journal. Such a first publication (which may require a good deal of editorial revision usually cordially supplied by editors) is really the crucial step in an entomological career. With it, the first impersonal bow is made to one's future colleagues, reprints

of the article are obtained for exchange, and one's personal pride becomes profoundly involved in the whole matter. The author's name does in fact become established in the literature of his chosen special group, and a decent pride is in order. With such an introduction, a life-long career as a specialist on a group of insects may well be under way.

Studies on insects may take two main directions. The complex life-histories of many insects, with their spectacular transformation from wingless grub or caterpillar to winged adult are adequately known for only a minority of the species that have been described and named. Some insects with less remarkable transformations have even more remarkable life-histories in which reproduction may be alternately by fertilized eggs and by "parthenogenesis." The production of living young by unmated females of plant-lice, which are ubiquitous and of great importance to agriculture and horticulture, for example, affords far-reaching problems for study that lie immediately at hand. The social insects, like the ants, wasps, and bees, and especially the wild bees, afford another inexhaustible field for observation, and, especially in the case of ants, for experiment. Thus in a broad sense the behavior of insects is the first of the directions of study offered, and this whole class of studies is exemplified by Dr. Lutz's book, by the backyard insect life-histories reported in a whole series of books by the French J. Henri Fabre, and most notably (and at a very high scientific level) by the American Peckhams (G. W. and Elizabeth G.), with their classic studies of the behavior of wasps and spiders at Milwaukee.

The other main line of study may go hand in hand with observation of life history and behavior. It is based on the growing personal collection of our student, whose local collecting will be supplemented by exchanges made first with the new series of entomological associates whom he will discover, second with the few specialists on his own group in other parts of the country, and finally with his fellow specialists in other parts of the world. In practically all of the groups of insects except the butterflies and larger moths, hosts of "new species" still require description and important improvements in classification remain to be made.

The mere description of new species is not scientific work of a high order, but it is essential research, and lays the foundation for the more important studies of life histories, and for the study of the insects in question in the framework of their environment—the new natural history—now becoming recognized as one of the most essential of the biological sciences under the name of ecology. The description of new species, however, has an extraordinary non-scientific feature in the game of naming them. This game is played on an international scale, with international rules of the most intricate character. There is the incentive



of beating one's colleagues to the discovery and naming of a new form, the privilege of choosing or inventing the new name, and the sop to one's vanity in the further rule that the describer's name is appended to the Latin technical name. It is perhaps not entirely surprising that some zoologists have succumbed to the lure of the game and concentrated on naming new forms (and even only forms supposed to be new) to the exclusion of the more serious interest of producing a sound classification of permanent value to science, and especially to ecology and animal geography.

When an entomological specialist has passed the hurdles of the first difficulties and has become launched on his avocation of study of his particular group, with a few published papers to advertise his competence, he is likely to learn that his type of study is in real demand, and specimens will be sent to him for description from other entomologists, from museums, and, finally, as a genuine accolade, even from the vast collection of the British Museum. It is his well-recognized privilege to retain a share of the specimens that he describes, in exchange for his services of identification, and thus his own collection grows steadily until it may well become "the greatest in the world." Exchanges from his collection with the half dozen fellow specialists on the same group will bring the thrill of shipments from South Africa or China, Paris or Prague, or, in former days, from some German university town.

Not only will the specialist's collection of specimens become notable, but by exchange, and perhaps a judicious purchase or two, he will acquire a notable personal library, "a pamphlet library," that forms a veritable tool for his further research. Indeed, as collection and library grow, the entomologist's family may sometimes have some concern about the parental temptation to expend a share of the family income. If comparisons can be made, however, the avocation of entomological studies is quite certain to be less costly than, say, golf.

The avenues of accessory interest that open to our student are numerous. He may make his own drawings for the new species to be described. He may engage in the fascinating field of insect photography. He may have a by-product of essays on his special subject and on natural history in general. He may quite probably acquire a reputation as the local naturalist in his home town, and have something of a clientele among its young people, and thus have a share in a much needed kind of education that supplements the schools and is an essential and effective addition to adult education. He may become involved in aid to the economic entomologists engaged in the warfare against insect pests, which often draws upon the most technical of entomological studies, and on studies in "pure science" that initially had no apparent economic application.

The wife of our home entomologist may find herself a "bug-widow," but this can scarcely be a greater hardship than to be a golf widow. She may, indeed, engage in her husband's studies herself, and in any case, she will have no worry as to her husband's whereabouts. His cronies will be at the nearest entomological society or museum. Local or extended travels, engaged upon by the whole family, are infused with double interest if collecting is carried on by this means. If the entomologist's children do not happen to interest themselves in his specialty, he may take comfort in the fact that his grandchildren are quite likely to do so. Indeed, I am inclined to recommend the man with a bent for natural history to the attention of the serious-minded young woman as having certain advantages for the roles of spouse and parent.

Much more might be said in favor of entomology as an avocation and I have by no means done justice to the difficulties that may beset the beginner who undertakes this kind of life-interest. I can only assure him that they have been surmounted and that with tenacity of purpose, he can do as well. It must again be emphasized that self-education for such a career may be entirely adequate.

There is much serious discussion of the need of education for the intelligent use of the leisure time implicit in further technological advances in manufacturing. It is therefore especially desirable that this activity be brought to the attention of the high school teachers of biology throughout the country. Surely, to take a share in the exploration of the world for its wealth and diversity of living creatures and to contribute by their study to the wealth of human culture is one of the upper bracket activities available as an avocation.

---

This issue of *The Chicago Naturalist*, which should have appeared early last December, has been delayed by a combination of circumstances beyond our control: lack of suitable manuscripts, the general shortage of enameled stock, insufficient help in our printing department, and unavoidable delay in obtaining the artist's sketch for the cover design. Thus for the first time since the *Naturalist* began it has not been possible to publish four numbers within the year to which the volume corresponds. We hope this may never occur again.

The index for Volume 8 will be printed separately and distributed with the next issue.

# Museum Activities

## Sunday Lectures, Winter Series

The winter series of Sunday Afternoon Lectures began January 6 and continued through February 24. These programs are free to the public.

Two showings were scheduled for each program—one at 3:00 and one at 4:15 P.M.

Jan. 6: *The Athabaska Country* (motion picture in color with recorded music), Norman Hallock, LaGrange.

Jan. 13: *Colors—Southwest* (motion picture in color), H. A. Frick and Maj. Wm. D. Frick, Chicago.

Jan. 20: *Westward Ho!* (motion picture in color with recorded music), James Cornelio, Chicago.

Jan. 27: *Tramping in the Smokies* (Kodachrome slides), W. F. Henderson, Ph. D., Chicago.

Feb. 3: *Sunsets over the Canadian Rockies* (Smoky and Peace River districts of western Canada, motion picture in color with recorded music), W. P. MacLean, Cicero.

Feb. 10: *Glimpses of Our National Parks* (Glacier, Yellowstone, Yosemite, and the Great Smoky Mountains National Parks, motion picture in color with recorded music), William R. Homan, Chicago.

Feb. 17: *Autumn Splendors in New England* (Foothills of the White, Green, Catskill, and Adirondak Mountains, illustrated with 4x5 Kodachrome slides), Louis J. Tint, M.D., Chicago.

Feb. 24: *Spring Flowers in the Midwest Woods* (Kodachrome slides), Charles E. Olmsted, Ph.D., University of Chicago.

## Back Numbers of the *Naturalist* and the *Audubon Bulletin*

A complete file of *The Chicago Naturalist*, 1938 to date (with the exception of Volume 6, Numbers 1 and 2), is now available to members of affiliated societies and members of the Academy at a nominal charge of \$1.00 to cover the cost of packing and postage.

The Illinois Audubon Society offers a complete set of back numbers of *The Audubon Bulletin*, 1916 to date (with the exception of numbers already out of print) to members of the society and other individuals who are interested at a cost of \$1.00 to cover packing and mailing costs. Requests should be addressed to the Illinois Audubon Society, 2001 No. Clark Street, Chicago 14, Illinois.

## Personnel

Miss Harriet M. Smith, assistant to the director since January, 1943, resigned at the end of December, 1945, to accept a position with Coronet Instructional Films, Glenview, Illinois. In her new position she is engaged in planning educational movies in color and sound on natural history subjects, a field of endeavor for which she is exceedingly well qualified. During her three years with the Academy Miss Smith had charge of public relations and educational activities—including the Sunday lectures and natural history programs for children—and a multiplicity of other duties, all of which she carried on with efficiency and enthusiasm. Her many friends wish her good success in her new work.

Captain Eliot C. Williams, Jr., on military leave since the summer of 1942, recently received his discharge from the Chemical Warfare Service and will resume his duties as assistant to the director on March 1.



# The Naturalist's Book Shelf

## MODERN BIRD STUDY

By Ludlow Griscom

Harvard University Press, Cambridge, Mass., 1945,  
190 pages, 10 maps and diagrams, index.

Cloth, \$2.50.

The author of this book has given us a lot of ornithological knowledge in a small package. At the outset the announcement of Mr. Griscom, who is an acknowledged master of the technique of identifying the living bird, that he intended to say little about that technique, was disappointing to one reader at least. However, further reading showed how much had to be omitted in order to say what was essential to the general plan of the work.

Much fascinating material is employed to tell of the capacity and intelligence of birds, their ability to adapt themselves to circumstances and of their migration and distribution. Throughout, the author's use of classical examples is so salted with parallels taken from his own experience as to give to the whole an original and pleasing flavor.

Most bird-minded folk in the States are preoccupied by the local avifauna or, perhaps, by that of North America. Hence many a reader of *Modern Bird Study* may make acquaintance for the first time with some of the interesting and puzzling problems adduced in a consideration of the origins, distribution and relationships of birds throughout the great zoögeographic regions of the earth.

In the final chapter, headed Classification, occurs a summing up in which one reads, "But, when all is said and done, the hopes of the scientist for a 'cut and dried' system in nature are doomed to disappointment; . . ." and "Diversity, not uniformity, characterizes the class of birds. How, then, can there be uniform criteria for classification?"

These are cogent passages, difficult to refute.

We are unable to agree with the author's conclusion as to the publication by editors of scientific journals of reported observations. He says, with truth, that "there is no possible criterion by which they can decide which ones are correct and which ones are possibly in error" but he says also that the only thing they can do is to publish none of them. For years the editor of *The Auk* and editors of other ornithological periodicals frequently have published reported observations and, doubtless, have declined frequently to do so. We think it would be inadvisable to bind them by any fixed rule.

But however one may differ with any single opinion of the author his book will be placed in the mind of the general reader as an adequate and scholarly presentation of its subject and as an excellent reference source.

E. R. Ford.

## A CATALOG OF ILLINOIS ALGAE

By Max E. Britton

Northwestern University Studies in the Biological Sciences and Medicine, no. 2, 1945, viii, 177 pages, index.

This well-bound little book is an annotated check list of the algae recorded in the literature from Illinois plus those found by the author during his investigations. Following the foreword by Prof. L. H. Tiffany and the acknowledgments, an introduction summarizes the distribution of the 962 specific and varietal entities and 178 genera, according to family, order, class and division. The introduction indicates that there are recorded collections of algae from only 64 of the 102 counties of the state. Considering the importance of fresh water algae as sources of fish food and of troubles in water reservoirs alone, it is clear that there is a critical need for filling in the

gaps in our knowledge of the algal flora of the state by a thorough systematic survey.

An informative section discussing the literature according to the different general phases of algology is included, together with a bibliography of 94 items which is intended to list all the papers that record algae from the state. The annotated list, or catalog, is arranged systematically, in the main following the arrangement of Prof. G. M. Smith's *Fresh Water Algae of the United States*. The entities below family rank are arranged alphabetically. A citation to at least one description readily available to most students is included for each species and the geographic distribution for each species is summarized by counties along with brief notes on habitat and seasonal distribution. Likewise, for each species the synonyms occurring in the Illinois literature are given. Specific collections are cited only for Dr. Britton's own collections or those in the Herbarium of the Chicago Natural History Museum. Finally there is a list of 50 entity-names excluded from the regular systematic list for one reason or another.

Summarizing the knowledge of Illinois algae in such a thoroughly documented and annotated check list, Dr. Britton has produced a long-wanted and welcome landmark in our literature by which contemporary students of Illinois algae may be guided and from which future students may well take their departure.

M. S. Doty.

## THE FLORA OF OAKLAND COUNTY, MICHIGAN; a study in physiographic plant ecology.

By Marjorie T. Bingham

Bulletin No. 22, Cranbrook Institute of Science, Bloomfield Hills, Michigan, 1945, 155 pages, halftones, 2 maps in pocket, glossary, paper cover. \$1.00.

Monographic studies of the flora or fauna of any region are always a welcome contribution to our knowledge and understanding of ecological communities. *The Flora of Oakland County,*

*Michigan* is a work of this type which, by its thoroughness and scope, will aid both the amateur and the professional student of biology in correlating the numerous physical factors which are constantly at work in any ecological community.

Briefly, the study is a consideration of the present plant life of the area as influenced by physiographic forces. After tracing the geological and topographical history, the author discusses and describes each of the typical plant communities now existing there. An annotated list—comprising 66 pages—of the plant species occurring in the county follows. Both scientific and common names are given in this list, although common names are used almost exclusively in the descriptive portion of the text. A summary, glossary, and bibliography round out the study. There is no index. A land type map and a map of the surface formations of Oakland County are included in a cover pocket.

The format and typography of the volume are attractive and well-executed. The halftones which have been carefully chosen and reproduced with exceptional clarity merit special commendation.

Kathryn J. Stephenson.

## THE BOOK OF NATURALISTS

Edited by William Beebe

Alfred A. Knopf, New York, 1944, xiv, 449 pages, 3 illustrations, bibliography. Cloth binding, \$3.50.

Subtitled "An Anthology of the Best Natural History," *The Book of Naturalists* presents the development and growth of natural history as reflected in the writings of naturalists—observers of living animals and plants under natural conditions—from Aristotle to the present day.

The editor, Dr. William Beebe, Director of the Department of Tropical Research of the New York Zoological Society, is one of America's foremost naturalists, explorers, and writers. It is unfortunate that modesty forbade inclusion of selections from his own delightful publications, but this loss is some-

what compensated by samples of his authorship as well as editorship in a preface and introductions to the two sections of the anthology.

For inclusion in this chronological treatment, Dr. Beebe required that a selection be scientifically sound in content, of quotable literary quality, and that the final compilation represent a wide distribution throughout time, nationality of authors, geography, and subject matter.

This is the sort of book one likes to have at hand for leisurely browsing. Each excerpt may serve as a stimulus to some reader to turn (or return) to the original works of a naturalist who had been only a name remembered vaguely from impersonal text-book summaries of scientific contributions.

Harriet M. Smith.

## WEEDS OF LAWN AND GARDEN; a Handbook for Eastern Temperate North America.

By John M. Fogg, Jr.

University of Pennsylvania Press, Philadelphia, 1945, vii, 215 pages, illustrations by Leonie Hager-ty, glossary, bibliography, index. \$2.50.

Perhaps our nation's gardeners have passed the stage characterized by unremitting toil and have come to the mellow age that permits thoughts of gardens in terms of earth, world, and soil history. For such contemplative folk, the twenty-six page introduction to this handbook should prove a special delight for it contains sections on the geographic origin, dispersal and nature of weeds. There are also practical and up-to-date suggestions on chemical control of weeds and stimulating suggestions on weeds as soil indicators.

The text proper deals with the work-a-day problems of identification and eradication of weeds. The author often departs from the precise taxonomic and floristic descriptions to introduce facts of habitat and life form that are a part of the gardener's experience with the "unwanted plants." Common names are followed by scientific names and the families are arranged according to the system devised by Engler and Prantl.

Of the 185 species described and illustrated, 78 are elaborated with drawings of pre-flowering stages, either juvenile, or, in the case of biennials, first-year. Eight trees with weedy habits have been added to the herbaceous species.

In addition to the recommendation of excellent and charming content, the book is constructed physically for ease and durability in handling.

Anna Pedersen Kummer.

## THE RING-NECKED PHEASANT and its Management in North America

Edited by W. L. McAtee

The American Wildlife Institute, Washington, D. C., 1945, xii, 320 pages, 31 plates, 12 figures, list of authors cited and index. Cloth, \$3.50.

Studies of this much esteemed game bird, in all the aspects of its largely-controlled existence in its North American range, are presented for eight regions by as many wildlife authorities. The result is a book which must appear to most game breeders, farmers and hunters as the "last word" on the subject. The authors, however, suggest many problems still to be worked out.

Pheasant behavior, as here described in detail, will suggest to the naturalist analogies to be looked for in the life histories of other species. For example we read that the pheasant's morning feeding does not begin for an hour or two after it leaves the roost. Possibly we have no knowledge so exact regarding the feeding hours of other birds.

Preceding the regional accounts is a foreword by the editor, an historical introduction by Frederick C. Walcott and, contributed by Jean Delacour, world authority, a section (with map) on the classification and distribution of this Asiatic bird in a wild state.

There is a frontispiece from a painting by Walter Weber and there are two color plates of paintings by T. H. Cooper.

This is a splendid book about a splendid bird.

E. R. Ford.



# THE CHICAGO NATURALIST

## Index to Volume Eight

1945

An asterisk (\*) indicates illustrations.

|                                                               |                            |                                                                        |                |
|---------------------------------------------------------------|----------------------------|------------------------------------------------------------------------|----------------|
| Adventures at a feeding shelf, by Margaret M. Nice            | 8                          | ferns                                                                  | 32             |
| An appraisal of natural history, by M. Maldonado-Koerdell     | 49                         | flycatcher, ash-throated                                               | 6              |
| April rain, by S. A. Harper                                   | 12                         | Ford, E. R., Bird-name Quiz                                            | 27, 34         |
| Audubon Bulletin                                              | 85                         | ———, They help themselves                                              | 33             |
| Audubon Society, Illinois                                     | 15                         | ———, Reviews by                                                        | 18, 35, 86, 88 |
| Autumn coloration, by C. A. Shull                             | 43                         | Girl who had never been bitten by a rattlesnake, The, by K. P. Schmidt | 30             |
| back numbers, of Chicago Nat.                                 | 85                         | Gloyd, H. K., Reviews by                                               | 62, 63         |
| bacteria                                                      | 75                         | Grau, Walter A.                                                        | 13, *14        |
| Bailey, A. M.                                                 | 15                         | grassland, plains                                                      | 23             |
| Ball, John R.                                                 | 13, 39                     | Harper, S. A., April rain                                              | 12             |
| bats                                                          | 4                          | ———, More about hummingbirds                                           | 28             |
| bee, honey                                                    | 7                          | Henderson, W. F., Monarch migration                                    | 34             |
| Bevan, W. A.                                                  | 39                         | Hollister, John Hamilcar                                               | 13             |
| Bignoniaceae                                                  | 55                         | Hollister, J. M., Identification of ferns                              | 32             |
| Bird-banding Conference                                       | 15                         | hummingbirds                                                           | 28             |
| Bird-name Quiz                                                | 27, 34                     | Identification of ferns, by J. M. Hollister                            | 32             |
| Book Shelf                                                    | 16, 35, 62, 86             | insects, study of                                                      | 79             |
| Burfeind, Nat T.                                              | 13, *14                    | jay, blue                                                              | 10             |
| Burnham Astronomical Society                                  | 13, 14                     | junco                                                                  | 9, 10          |
| cardinal                                                      | 8                          | Kummer, Anna P., The role of weeds in maintaining the plains grassland | 23             |
| Casa Grande National Monument                                 | *2, 3                      | ———, Reviews by                                                        | 16, 35, 88     |
| Chicago Academy of Sciences                                   | 13, 14, 15, 38, 39, 61, 85 | Leaf form and variation: Bignoniaceae, by Sister Mary Ellen O'Hanlon   | 55             |
| ———, Affiliated Societies                                     | 39                         | Lectures                                                               | 61, 85         |
| ———, Annual Meeting                                           | 13                         | Lincoln Park                                                           | 15             |
| ———, Children's Programs                                      | 15, 39                     | Lyon, Wm. I., Bird-banding council                                     | 15             |
| ———, Lectures                                                 | 61, 85                     | Maldonado-Koerdell, M., An appraisal of natural history                | 49             |
| ———, Lobby Exhibits                                           | 15, 38, 61                 | Martin, Isabelle Hollister                                             | 13             |
| ———, New Members                                              | 14                         | Massee, Burt A.                                                        | 13             |
| ———, Publications                                             | 38                         | Meeker, Grace R., Review by                                            | 62             |
| chickadee                                                     | 9, 10                      | Microbes of merit, by Otto Rahn                                        | 75             |
| cuckoo, European                                              | *73                        |                                                                        |                |
| Cuculus canorus canorus                                       | *73                        |                                                                        |                |
| Davis, N. S.                                                  | *13                        |                                                                        |                |
| Dodge, Natt N., Modern inhabitants of prehistoric Casa Grande | 3                          |                                                                        |                |
| Doty, M. S., Review by                                        | 87                         |                                                                        |                |
| Entomology, as avocation                                      | 79                         |                                                                        |                |

|                                                                                       |                           |                                                                                                           |                   |
|---------------------------------------------------------------------------------------|---------------------------|-----------------------------------------------------------------------------------------------------------|-------------------|
| Modern inhabitants of prehistoric Casa Grande, by N. N. Dodge                         | 3                         | Campbell, Sam, Too much salt and pepper, by Harriet M. Smith                                              | 37                |
| Monarch migration, by W. F. Henderson                                                 | 34                        | Campbell, Sam, Eeny, Meeny, Miney, Mo—and Still-Mo, by Harriet M. Smith                                   | 64                |
| More about hummingbirds, by S. A. Harper                                              | 28                        | Conard, H. S., How to know the mosses, by Grace R. Meeker                                                 | 62                |
| Museum activities                                                                     | 13, 38, 61, 85            | Cooley, R. A. and G. M. Kohls, The Argasidae of North America, Central America, and Cuba, by Orlando Park | 36                |
| National Parks Magazine                                                               | 3                         | Fogg, J. M., Jr., Weeds of lawn and garden, by Anna P. Kummer                                             | 88                |
| Natural history, as avocation                                                         | 79                        | Greenhood, David, Down to earth, by W. E. Powers                                                          | 17                |
| Nature walks                                                                          | 15                        | Griscom, Ludlow, Modern bird study, by E. R. Ford                                                         | 86                |
| Nice, Constance, Some pets of the Trailside Museum                                    | 47                        | Hausman, L. A., The illustrated encyclopedia of American birds, by M. M. Nice                             | 16                |
| Nice, Margaret Morse, Adventures at a feeding shelf                                   | 8                         | Hochbaum, H. A., The canvasback on a prairie marsh, by E. R. Ford                                         | 35                |
| ———, Seven baby birds in Altenberg                                                    | 67                        | Jones, G. N., Flora of Illinois, by Anna P. Kummer                                                        | 35                |
| ———, Review by                                                                        | 16                        | McAtee, W. L., The ring-necked pheasant, by E. R. Ford                                                    | 88                |
| Notes from the field                                                                  | 32, 33, 34                | Nice, Margaret Morse, Studies in the life history of the song sparrow II, by E. R. Ford                   | 18                |
| ———, junior department                                                                | 34                        | Pope, C. H., Amphibians and reptiles of the Chicago area, by H. K. Gloyd                                  | 62                |
| nuthatch, white-breasted                                                              | 9                         | Role of weeds in maintaining the plains grassland, by Anna P. Kummer                                      | 23                |
| O'Hanlon, Sister Mary Ellen, Leaf form and variation: Bignoniaceae                    | 55                        | Schmidt, K. P., The girl who had never been bitten by a rattlesnake                                       | 30                |
| Olmsted, Charles E.                                                                   | 13                        | ———, The specialist at home                                                                               | 79                |
| owl, great horned                                                                     | 4, 5, *6                  | serin                                                                                                     | 68, *69, *71, *74 |
| Park, Orlando, Review by                                                              | 36                        | Serinus canaria serinus                                                                                   | 68                |
| Pettingill, O. S.                                                                     | 15                        | Seven baby birds in Altenberg, by Margaret Morse Nice                                                     | 67                |
| phoebe, Say's                                                                         | 6                         | Shull, Charles A., Autumn coloration                                                                      | 43                |
| Phoenicurus phoenicurus                                                               | 68                        | Simonds, James P.                                                                                         | *13               |
| Pirnie, M. D.                                                                         | 15                        |                                                                                                           |                   |
| Powers, W. E., Review by                                                              | 17                        |                                                                                                           |                   |
| Rahn, Otto, The world without microbes                                                | 75                        |                                                                                                           |                   |
| rattlesnake, diamond                                                                  | 30                        |                                                                                                           |                   |
| redstart, European                                                                    |                           |                                                                                                           |                   |
|                                                                                       | *66, 67, 68, 69, *70, *71 |                                                                                                           |                   |
| Reid, Kenneth A.                                                                      | *13                       |                                                                                                           |                   |
| REVIEWS:                                                                              |                           |                                                                                                           |                   |
| Beebe, W., The book of naturalists, by Harriet M. Smith                               | 87                        |                                                                                                           |                   |
| Bingham, Marjorie T., The flora of Oakland County, Michigan, by Kathryn J. Stephenson | 87                        |                                                                                                           |                   |
| Breckenridge, W. J., Reptiles and amphibians of Minnesota, by H. K. Gloyd             | 63                        |                                                                                                           |                   |
| Britton, Max E., A catalog of Illinois algae, by M. S. Doty                           | 86                        |                                                                                                           |                   |
| Cain, S. A., Foundations of plant geography, by Anna P. Kummer                        | 16                        |                                                                                                           |                   |

|                                     |            |                                     |        |
|-------------------------------------|------------|-------------------------------------|--------|
| Smith, Harriet M.                   | 85         | Test your nature lore               | 27, 34 |
| ———, Reviews by                     | 37, 64, 87 | Texas folktale                      | 30     |
| snake, whip                         | 4          | They help themselves, by E. R. Ford | 33     |
| Some pets of the Trailside Museum,  |            | tit, blue                           | 67     |
| by Constance Nice                   | 47         | ———, tufted                         | 9      |
| sparrow, English                    | 9          | Trailside Museum                    | 47     |
| ———, song                           | 9, 67      | Weeds                               | 23     |
| ———, tree                           | 9, 67      | Williams, Eliot C., Jr.             | 39, 85 |
| ———, white-crowned                  | 11         | Windsor, Alton S.                   | 13     |
| Specialist at home, The, by Karl P. |            | woodpecker, downy                   | 9      |
| Schmidt                             | 79         | ———, hairy                          | 9      |
| Stephenson, Kathryn J., Review by   | 87         | World without microbes, The, by     |        |
| swallow, rough-winged               | 6          | Otto Rahn                           | 75     |
|                                     |            | wren, Carolina                      | 9      |







## Sell your camera to Bass

If you have any unused equipment Bass will pay you highest prices for it.

Don't let your idle equipment gather dust . . . turn it into cash at once.

But whether you BUY, SELL or TRADE you can always do better at Bass.



- GRAFLEX
- GRAPHIC
- LEICA
- CONTAX
- ROLLIEFLEX
- as well as  
complete 8 and 16 mm.  
Cine equipment.



## BIOLOGICAL CHARTS

The Turtox Handbook of American Biological Charts includes:

- 4 Natural Color Plates
- 54 Photographs in black and white
- 167 Drawings
- 312 Listings of American-made Biology Charts
- 216 Key cards and quiz sheets
- 10 Items of Chart Equipment

Ask for your copy of this 80-page book today. Mailed Free to any biology teacher.

GENERAL BIOLOGICAL SUPPLY HOUSE

Incorporated

761-763 East Sixty-ninth Place, Chicago 37, Illinois

# MEMBERSHIP

## in

### The Chicago Academy of Sciences

helps support

The Museum of Natural History  
Public lectures throughout the fall and winter months  
Educational programs for young people  
Extension work in cooperation with the schools and the  
Chicago Park District  
Field studies of local flora and fauna and expeditions to other  
regions  
Research by staff members  
Publications, both technical and popular  
Libraries, a children's library and a scientific library

Although the Academy is at present filling a definite place in the educational life of the Chicago Region, its resources are inadequate for the services it is potentially able to render. Those interested in advancing education in natural history are invited to help by supporting such activities through membership in the Academy.

#### PRIVILEGES OF MEMBERSHIP

All members of the Academy receive *The Chicago Naturalist* four times a year . . . Special announcements of lectures and other activities . . . Reserved seats for Academy lectures . . . Access to the study collections . . . Use of the scientific library and reading room . . . Cordial assistance from members of the museum staff in connection with studies or special interests.

#### MEMBERSHIP FEES

|            |               |                 |              |
|------------|---------------|-----------------|--------------|
| Sustaining | \$25 per year | Associate       | \$3 per year |
| Annual     | \$10 per year | Life Membership | \$100        |

#### THE CHICAGO NATURALIST

is available to institutions such as libraries, schools, clubs, and comparable organizations at a subscription price of \$1.50 per year.